

SECTION 21 13 13

WET-PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wet pipe automatic sprinkler system.
- B. Undercar deluge system.
- C. Exposed and embedded pipe and fittings.
- D. Pipe hangers and support.
- E. Valves.
- F. Fire department connection.
- G. Sprinkler heads.
- H. Signs.
- I. Tools and spare parts.
- J. Inspector's test valves.
- K. Waterflow indicating switch.

1.02 RELATED SECTIONS

- A. Wet standpipe system is specified in Section 21 12 00 – Fire-Suppression Standpipe.

1.03 MEASUREMENT AND PAYMENT

- A. General: Wet-pipe fire suppression sprinkler system will not be measured separately for payment but will be paid for as part of the Contract lump-sum price for Mechanical Work.

1.04 REFERENCES

- A. American Society for Testing Materials (ASTM):
 - 1. ASTM A123 Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
 - 2. ASTM A153 Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
 - 3. ASTM A395 Specification for Ferritic Ductile Iron Pressure Retaining Castings

4. ASTM A582 Specification for Free-Standing Stainless and Heat-Resisting Steel Bars, Hot Rolled or Cold Finished
5. ASTM B16 Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines
6. ASTM B124 Specification for Copper and Copper-Alloy Forging Rod, bar and Shapes
7. ASTM B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
8. ASTM F437 Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
9. ASTM F438 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
10. ASTM F439 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
11. ASTM F442 Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
12. ASTM F493 Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings

B. American Welding Society (AWS)

1. AWS D10.9 Specification for Qualification of Welding Procedures and Welders for Piping and Tubing

C. National Fire Protection Association (NFPA):

1. NFPA 13 Standard for the Installation of Sprinkler Systems
2. NFPA 14 Standard for the Installation of Standpipe and Hose Systems
3. NFPA 15 Water Spray Fixed Systems for Fire Protection
4. NFPA 24 Private Fire Service Mains and Their Appurtenances
5. NFPA 25 Standard for Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
6. NFPA 70 National Electrical Code
7. NFPA 72 National Fire Alarm Code

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
 - B. Shop Drawings: Submit Shop Drawings to include the following requirements:
 - 1. Current water flow information;
 - 2. Hydraulic calculations;
 - 3. Sprinkler piping on plans and sections to scale;
 - 4. Sprinkler head locations coordinated with reflected ceiling plans;
 - 5. Hanger locations and details; and
 - 6. Accessory locations and details (such as valves and gages).
 - 7. Shop Drawings shall show the complete system, including construction phasing, pipe materials used, jointing methods, supports, floor and wall penetration seals, and sprinkler locations. Partial submittals will be rejected for resubmission of complete submittals.
 - C. Product Data: Submit manufacturers' product data for all manufactured items of materials and equipment and sprinkler heads.
 - D. Certificates of Compliance: Submit such certified test reports for materials and equipment as necessary to demonstrate compliance with specification requirements.
 - E. O & M Data: Submit operation and maintenance data for the equipment and system provided, in accordance with Section 01 78 23 - Operation and Maintenance Data. Include recommended spare parts list.
 - F. Certified Test Reports: Submit certified test reports on Contractor's Material and Test certificate for aboveground and underground piping as shown in NFPA 13.
 - G. State Fire Marshal: Separate Shop Drawings of the fire protection automatic sprinkler system shall be submitted to the State Fire Marshal for approval. Approval shall be obtained before beginning installation work. The Contractor shall submit a copy of the Contractor's transmittal to the State Fire Marshal for the Engineer's information.
- 1.06 QUALITY ASSURANCE**
- A. The system installer of subcontractor shall possess a valid C-16 California Contractor's License. The fire suppression system shall be designed by an experienced and qualified individual of firm regularly engaged in the design of fire suppression systems. Drawings and Calculations shall be sealed and stamped by a currently registered California Professional Engineer.

- B. Materials shall be clearly marked or stamped with the manufacturer's name, nameplate data or stamp, rating, and conformance with ASTM standards, with corresponding standard number clearly marked, as applicable.
- C. Fire protection material and equipment shall be tested and shall be listed by a nationally recognized testing laboratory of fire protection equipment. In addition, valves and grooved fittings shall also be approved for fire protection service by an organization concerned with product evaluations for compliance with appropriate standards for production of listed items.
- D. Galvanizing shall conform to the requirements of ASTM A123. Galvanized nuts, bolts, and washers shall conform to the requirements of ASTM A153.

1.07 SITE CONDITIONS

- A. Excavations where products will be buried shall be dry. Inspect surfaces and structures where the water supply system will be installed before the work of this Section begins. Provide surfaces and structures capable of supporting the system and its weight.
- B. Coordinate the installation of the water supply system with other building systems and components so as to avoid conflicts of installation. Contract Drawings are diagrammatic and not necessarily to scale. Do not scale drawings for exact locations of installation of pipelines, valves, and equipment.

PART 2 - PRODUCTS

2.01 WET PIPE AUTOMATIC SPRINKLER SYSTEM

- A. Design Standards: Design the automatic sprinkler system in accordance with NFPA 13 for Ordinary Hazard using a hydraulically designed system where indicated or as directed by local authority having jurisdiction.
- B. Areas Requiring Protection:
 - 1. Office buildings, main repair shop with offices, training centers, control towers, transportation buildings and storages;
 - 2. Vent shaft structures; and all public areas at below grade stations, all station ancillary spaces (except electrical rooms, train control and communications rooms, traction power substations, and auxiliary power rooms), including fan rooms, valve rooms, storage rooms, corridors, rest rooms, offices, unassigned spaces, and stairwells, shall be provided with automatic sprinkler protection. Provide as indicated for other structures.

2.02 UNDERCAR DELUGE SYSTEMS

- A. Provide undercar deluge systems at stations with platform levels that are below grade.
- B. The undercar deluge systems, five zones per track, shall be hydraulically designed in accordance with NFPA 15. The systems shall be designed for remote manual activation.
- C. Each zone shall be designed to provide a minimum of 250 gpm to the underside of a two vehicle pair.

- D. Coordinate the design with the applicable work of Division 16 to assure that the systems are properly interfaced, supervised, and controlled.

2.03 EXPOSED AND EMBEDDED PIPE AND FITTINGS

- A. Aboveground except parking structures: Class S, as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- B. Aboveground in all parking structures: Class R, as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- C. Underground: Class K for 4 inches and larger pipe, Class H for 3 inches and smaller pipe, as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

2.04 PIPING ACCESSORIES

- A. Provide piping accessories of type and size as indicated.
- B. Provide piping passing through floors, walls, and ceilings with chrome split wall plates.
- C. Place flexible connections above and below each riser valve assembly, and between exposed and embedded piping.

2.05 PIPE HANGERS AND SUPPORT

- A. Furnish and install in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services
- B. Seismic and Support Requirements:
 - 1. Seismic restraints, anchorages and reinforcements shall be provided for equipment and piping in accordance with the California Building Code, NFPA 13 and Appendix A, NFPA 14 and local code standards and regulations. Equipment and piping shall be anchored to withstand forces generated by earthquake movement. As a minimum, pipe and equipment supports and downward forces of five times the weight of the equipment or pipe, full of water, plus weight of valves and fittings attached, plus 250 pounds with the force acting at the pipe center or equipment center of gravity, in accordance with NFPA 13.
 - 2. The seismic bracing shown on the drawings sets forth the minimum requirements. Contractor shall furnish and install additional seismic bracing at: a) base and top of risers in conjunction with supports to prevent uplift, b) changes in direction, c) offsets with emphasis on restraining longitudinal motion, d) on longitudinal piping supported by clevis type hangers exceeding 6 inch distance between pipe centerline and mounting surface, e) on longitudinal piping supported by angle bracket type hangers exceeding 8 inch distance between pipe centerline and mounting surface, and f) at other locations in accordance with NFPA 13 and appendices thereto. Seismic bracing shall be designed to prevent both transverse and longitudinal displacement forces with longitudinal restraints

located, as a minimum, 40 foot on center and two way (longitudinal/transverse) restraints on 80 foot centers

3. Pipe supports shall be capable of supporting a total weight equal to five times the weight of the equipment or pipe, full of water, plus weight of valves and fittings attached, plus 250 pounds with the force acting at the pipe center or equipment center of gravity. Only clevis or minimum 1/4 inch thick times 2-inch wide fabricated steel hangers that are hot dipped galvanized after fabrication shall be used and all nuts shall be nylon lock tight or threads coated with Engineer approved adhesive.

2.06 VALVES

- A. Refer to Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for valves of types, sizes, and configurations indicated. Gate and butterfly valves shall indicate the open or closed position to water flow. Provide gate and butterfly valves, with electric switch that will be positioned by the valve stem so that open or closed position of valve can be remotely monitored.
- B. Alarm check valve may be used in lieu of check valve and water flow indicating switch. Valve shall be provided with trim for variable pressure installation and shall be provided with alarm pressure switch. Coordinate switch configuration and contact rating with applicable requirements.
- C. Drain Valves:
 1. Compression Stop: Bronze with hose thread nipple and cap.
 2. Ball Valve: Brass with cap and chain, 3/4 inch, hose thread.

2.07 FIRE DEPARTMENT CONNECTION

- A. Provide two-way brass or bronze siamese, wall or flush type, with inlet plugs and chains or caps, conforming with NFPA 13. Provide self-closing clapper valve in each inlet, and local fire department inlet hose threads.
- B. Fire department connection shall be labeled as AUTO-SPRINKLER in raised cast form on surface of either fitting or escutcheon. Exposed parts, including escutcheon, shall have either polished brass or polished chromium-plated finish.

2.08 SPRINKLER HEADS

- A. In areas without ceilings, sprinkler heads shall be glass bulb style (upright, pendant, side-wall) as required for the particular application, 1/2-inch discharge orifice, ordinary temperature rating, unless otherwise indicated or required.
- B. In areas with ceilings, sprinkler heads shall be flush style, 1/2-inch discharge orifice, ordinary temperature rating, unless otherwise indicated or required.
- C. Undercar deluge spray nozzles shall be wide-angle spray type, equipped with dust cap.

2.09 SIGNS

- A. Provide signs and identification as specified in Section 20 40 13 - Identification for Facility Services, and in conformance with NFPA 13. Attach signs and identification to each valve required to be identified.

2.10 TOOLS AND SPARE PARTS

- A. Provide each system with sprinkler cabinet and six of each type of sprinkler heads of all types and ratings installed, a sprinkler wrench, and a pair of sprinkler tongs.

2.11 INSPECTOR'S TEST VALVES

- A. Test valve shall be supplied from the highest and most remote part of the system in relation to the riser assembly. Installed test valve shall be within 7 feet of the floor.

2.12 WATERFLOW INDICATING SWITCH

- A. Provide waterflow indicating switch as indicated, conforming with NFPA 72. Coordinate switch configuration and contact rating with applicable requirements of Division 26.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Excavating and backfilling, including bedding and compacting requirements, shall conform to Section 33 05 28 - Trenching and Backfilling for Utilities.
- B. Provide concrete thrust blocks for elbows, tees, valves, and appurtenances on buried piping. Thrust blocks shall be constructed as indicated.
- C. Install products as indicated and in accordance with NFPA standards referenced in Article 1.04, as applicable.
- D. Install pipe, fittings, and valves without springing or forcing. Apply pipe compound to male threads. Flanged joints shall be made up with a torque wrench and by tightening every other bolt around the flange, then by tightening the remaining bolts; bolt holes of flanges on horizontal pipe shall straddle pipe centerlines. Install anchors as indicated. Provide swing joints or flexible connections for transitions from embedded to exposed pipe.
- E. Install piping true to grade and line. Support and guide piping to ensure alignment under all conditions. Installed piping shall clear obstructions, preserve headroom, and keep openings and passageways clear.
- F. Make changes in direction of piping with fittings. Provide branch connections with either screwed, grooved end, or welded tees, forged welding branch outlets, or welding fittings.
- G. Welding shall be performed only in the shop. Welders shall be qualified in accordance with AWS D10.9. Field welding will not be permitted.
 - 1. Align component parts to be welded in a manner that will ensure that no strain will be placed on the area to be welded. Do not offset pipe wall by more than 20 percent of the

wall thickness. Preserve alignment during the welding operation. Provide tack welds of the same quality, and applied by the same procedure, as the completed weld. Otherwise, remove tack welds during the welding operation.

2. Remove defective welds and provide new welds as required at no additional cost to the District.
 3. Electrodes shall be stored in a dry heated area. Electrodes shall be kept free of moisture and dampness during fabrication operations. Discard electrodes that have lost part of their coating.
- H. Provide installed sprinkler piping that is capable of being thoroughly drained and, where practicable, is arranged to drain at the main drain valves.
- I. Valves shall be accessible for operation and servicing. Valves located in furred spaces shall be accessible through access panels or access doors. Valves shall have no stems located below the horizontal position.
- J. Provide escutcheon plates at finished surfaces where exposed piping, bare or insulated, passes through floors, walls, and ceiling. Fasten escutcheon to pipe or pipe covering.
- K. Install sprinkler heads upright. Orient directional heads to spray the space indicated.
- L. Route piping in orderly manner, plumb and parallel to structure. Maintain gradient.
- M. Install piping to conserve space, to not interfere with use of space and other work.
- N. Group piping whenever practical at common elevations.
- O. Sleeve pipes passing through partitions, walls, and floors.
- P. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- Q. Inserts:
1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- R. Pipe Hangers and Supports:

1. Install in accordance with NFPA 13 and NFPA 14.
 2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 3. Place hangers within 12 inches of each horizontal elbow.
 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 7. Prime coat exposed steel hangers and supports. Refer to Section 09 91 00 - Painting. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- S. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- T. Prepare pipe, fittings supports, and accessories to finish painting. Where pipe support members are welded to structural framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 91 00 - Painting.
- U. Do not penetrate structural members unless indicated.
- V. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
- W. Install approved back flow preventer assembly at sprinkler system water source connection.

3.02 PAINTING

- A. Except where indicated, piping systems shall not be painted. Where pipes are indicated to be painted, prepare pipe in accordance with Section 09 91 00 - Painting. Provide protective covering to keep paint away from the sprinkler heads. Protective covering shall be removed under Section 09 91 00 - Painting.

3.03 IDENTIFICATION

- A. Comply with the requirements of Section 20 40 13 - Identification for Facility Services.

3.04 FIELD QUALITY CONTROL

- A. System will be inspected and tested in accordance with NFPA 25 for compliance with these Specifications.

WET-PIPE SPRINKLER SYSTEM

- B. Test installed systems and products hydrostatically, using testing instruments calibrated by a qualified laboratory in accordance with Section 01 45 00 - Quality Control, and flush in accordance with applicable requirements of NFPA 13. Repair leaks.
- C. The Contractor shall perform all tests in the presence of the Engineer and shall furnish all items used in testing. The Contractor shall give 48 hour notice prior to test. The Engineer will review certificates and test reports, and will inspect the automatic sprinkler system to verify conformance with NFPA 13.
- D. Provide system flushing at rate conforming with NFPA standards referenced in Article 1.04.

3.05 ADJUSTING, CLEANING, AND TRAINING

- A. Eliminate leaks, set sprinklers to cover the space indicated, calibrate pressure gages, and remove foreign material from the installed products.
- B. Refer to Section 01 79 00 - Demonstration and Training, for maintenance personnel training requirements.
- C. Flush entire piping system of foreign matter.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

- A. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish, remove after painting. (Replace painted sprinklers with new).

END OF SECTION 21 13 13